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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/516,358	11/24/2004	Hacene Lahreche	15675P556	2705

7590 01/11/2007
Blakely Sokoloff Taylor & Zafman
12400 Wilshire Boulevard
7th Floor
Los Angeles, CA 90025

EXAMINER

SONG, MATTHEW J

ART UNIT	PAPER NUMBER
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1722

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/11/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/516,358

Applicant(s)

LAHRECHE ET AL.

Examiner

Matthew J. Song

Art Unit

1722

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Objections

1. Claims 8-23 objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim the claims dependent from multiple dependant claims. See MPEP § 608.01(n).

Accordingly, the claims 8-23 not been further treated on the merits.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kub et al (US 2003/0064535 A1) in view of Beaumont et al (US 6,325,850).

Art Unit: 1722

Kub et al teaches a method of growing an epitaxial GaN layer on a substrate; implanting hydrogen ions into the GaN layer and heating to split the GaN layer along the implant layer ([0026]-[0034]).

Kub et al does not teach the deposition of GaN comprises at least one step of epitaxial lateral overgrowth.

In a method of epitaxial lateral overgrowth of GaN, note entire reference, Beaumont et al teaches the deposition of a layer of GaN; deposition a dielectric layer, which is etched; deposition of GaN in the openings and lateral growth until the patterns coalesce (col 3, ln 1-45 and Example 1). Beaumont et al also teaches these surfaces resulting from the coalescence of islands exhibit superior crystal quality to the layers grown heteroepitaxially on sapphire (col 4, ln 15-45) and lower defect density (col 9, ln 1-40).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Kub et al by using the lateral overgrowth process of forming GaN, as taught by Beaumont et al, to produce a GaN with superior crystal properties and reduced defect density.

Referring to claim 2, the combination of Kub et al and Beaumont et al teaches growing GaN ('535 [0037] and '850 col 3, ln 1-30), implanting H ions into GaN ('535 [0037]), and growing GaN thereon via lateral growth ('850 col 3, ln 1-30). The combination of Kub et al and Beaumont et al also teaches separation by heating ('850 col 5, ln 1-10 and '535 [0039]).

Referring to claim 3, the combination of Kub et al and Beaumont et al teaches vapor phase ELO ('850 col 4, ln 20-45).

Referring to claims 4 and 16, the combination of Kub et al and Beaumont et al teaches HVPE ('850 col 4, ln 20-45).

Art Unit: 1722

Referring to claim 5, the combination of Kub et al and Beaumont et al teaches deposition of GaN; deposition of a dielectric layer, which is etched; deposition of GaN; deposition in opening until the growth coalesces ('850 col 3, ln 1-35 and Example 1).

Referring to claim 6, the combination of Kub et al and Beaumont et al teaches deposition of SiN, deposition of GaN and annealing at 1080°C so that the continuous layer converts to a discontinuous layer formed of GaN and growing GaN thereon ('850 col 8, ln 20 to col 9, ln 40). The combination of Kub et al and Beaumont et al does not teach a SiN thickness of 10-20 nm, however it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Kub et al and Beaumont et al by optimizing the thickness of SiN to obtain GaN islands of a desired shape and size for subsequent growth.

Referring to claim 7, the combination of Kub et al and Beaumont et al does not teach when the implantation occurs, however it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Kub et al and Beaumont et al by implanting after total coalescent of the these islands because separating a complete film is taught by Kub et al.

Referring to claim 8, the combination of Kub et al and Beaumont et al teaches hydrogen ions, this clearly suggests H⁺.

Referring to claims 9-11, the combination of Kub et al and Beaumont et al teaches hydrogen ions at a concentration of $5 \times 10^{16} \text{ cm}^{-2}$ using 160 keV ('535 [0067]).

Referring to claim 12, Kub et al discloses forming GaN, implanting, then bonding to a transfer substrate, and annealing to separate. Kub et al does not teach separation is implemented by a return to ambient temperature after the resumption of epitaxy. Kub et al does teach

Art Unit: 1722

separation by heating to 500-800°C ('535 [0034]). Beaumont et al teaches a self supported epitaxial layer after the substrate has been separated (col 5, ln 1-10) and epitaxial deposition at 1080°C (col 6, ln 50-67). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Kub et al by not bonding to a handle substrate to form a free standing GaN film, which can be used in the production of laser diodes, as taught by Beaumont et al (col 5, ln 1-10) by cooling to room temperature after deposition because deposition occurs at a sufficient temperature for separation.

Referring to claim 13, the combination of Kub et al and Beaumont et al teaches implanting 1500 nm into the middle of the GaN layer ('535 [0067] and Fig 1a).

Referring to claims 14-15, the combination of Kub et al and Beaumont et al teaches sapphire substrate ('850 col 9, ln 40-65).

Referring to claim 17, the combination of Kub et al and Beaumont et al teaches doping with Mg ('850 col 7, ln 1-67).

Referring to claims 18-19, the combination of Kub et al and Beaumont et al a GaN film with a thickness of 1-1000 micrometers ('850 col 5, ln 1-10), overlapping ranges are held to be *prima facie* obvious (MPEP 2144.05).

Referring to claim 20-21, the combination of Kub et al and Beaumont et al teaches the substrate, which can be used for the claimed intended use. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

Art Unit: 1722


Referring to claim 22-23, the combination of Kub et al and Beaumont et al teaches laser diodes ('850 col 2, ln 1-10).

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Song whose telephone number is 571-272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


YOGENDRA N. GUPTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

Matthew J Song
Examiner
Art Unit 1722

MJS
January 4, 2007